United States Patent [19]

Kibler

[11] **3,974,951**

[45] **Aug. 17, 1976**

[54] **PRINTER MECHANISM**

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[52] **U.S. Cl.** **226/143;** 226/51; 226/152

[51] **Int. Cl.²** **B65H 17/22**

[58] **Field of Search** 226/51, 134, 135, 136, 226/143, 152, 158, 188

[56] **References Cited**

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[57] **ABSTRACT**

There is described a record material feed mechanism for use in an electronic cash register for feeding a record member to a printing station wherein data is printed on print lines located on the record member during the operation of the cash register. The feed mechanism will automatically position each succeeding print line of the record member adjacent the printing station on successive printing operations of the cash register. Included in the feed mechanism are a pair of cam actuated gear segments which control the length of movement of the record member between a home position and a position adjacent the printing station in the cash register. During the feeding of the record member to the printing station, the gear segments are positioned in tandem to move the record member a predetermined length while in a feed-out operation, the segments are positioned in an overlap condition to move the record member a distance which is one print line less than the feed-in movement.

11 Claims, 5 Drawing Figures

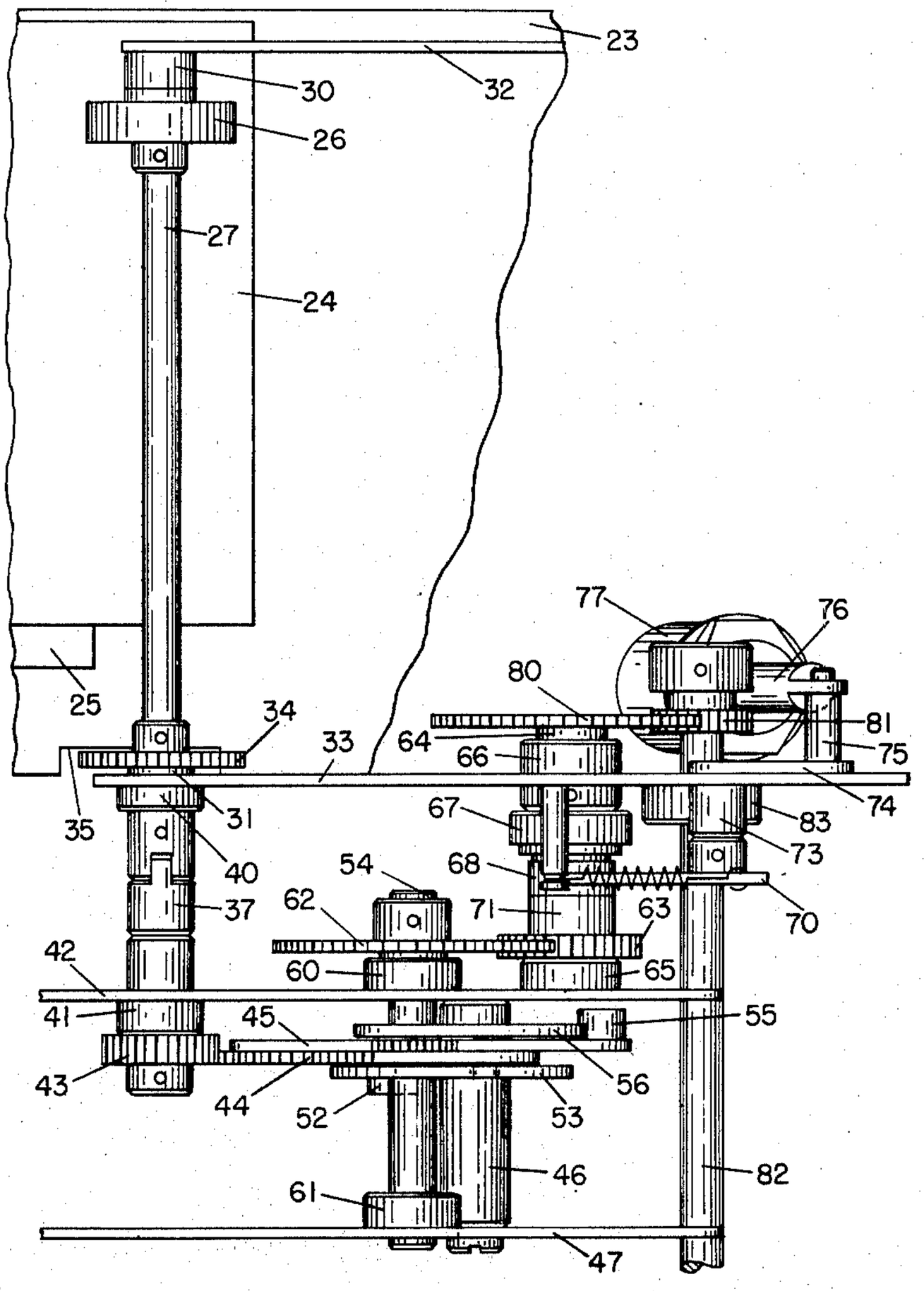


FIG. 1

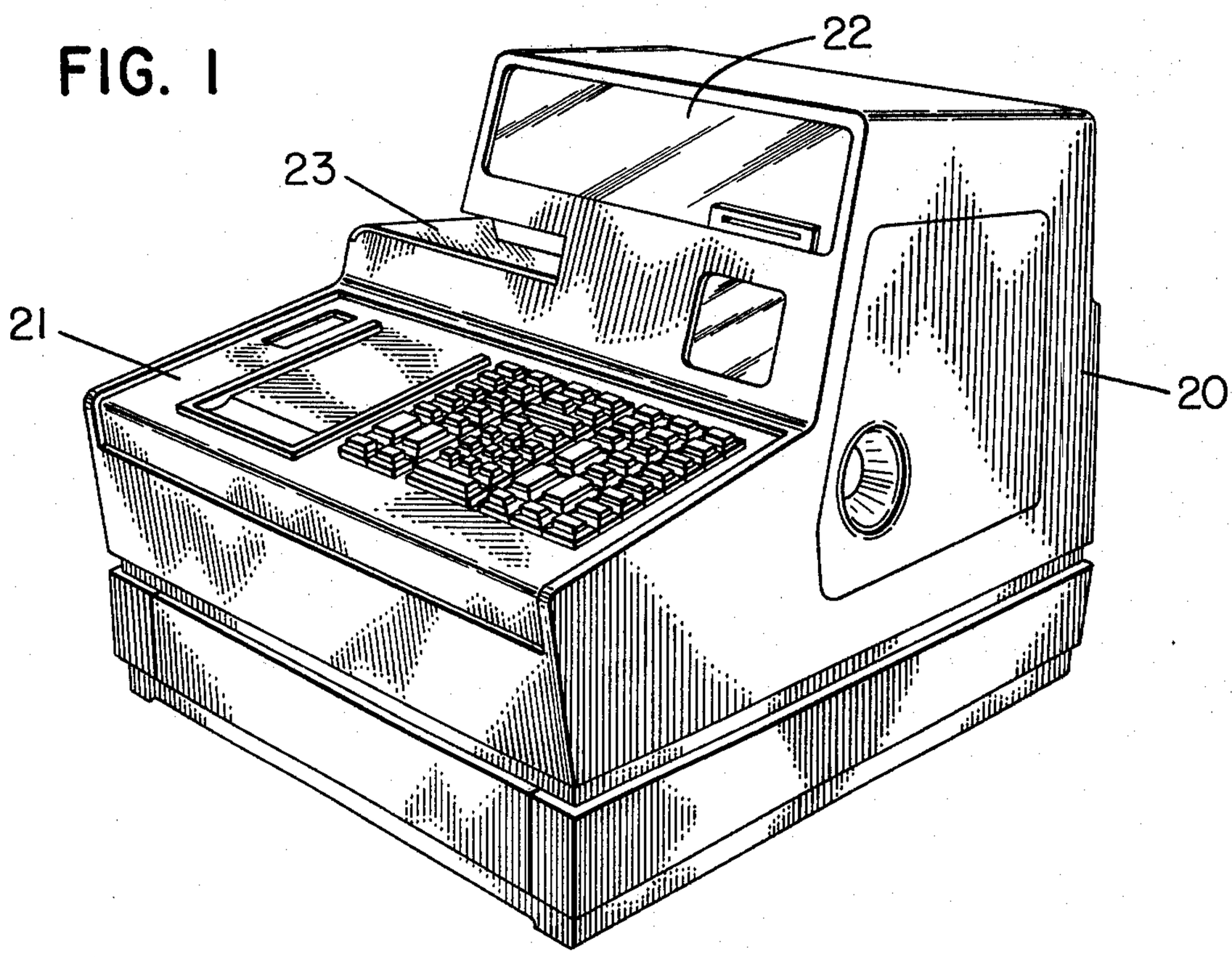
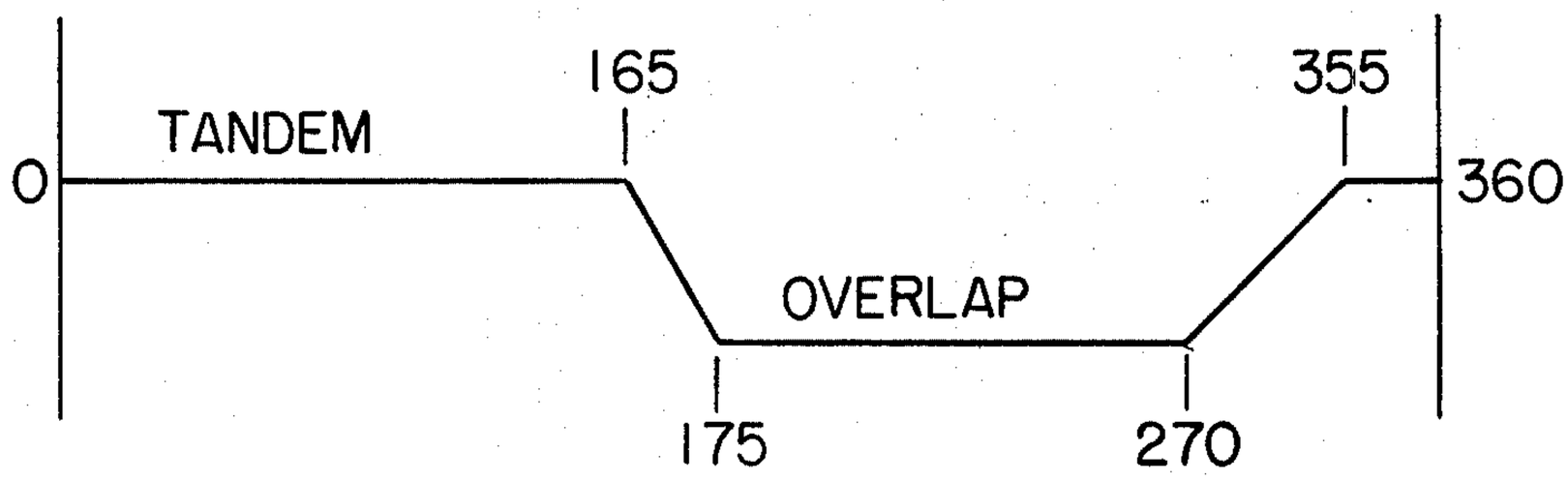


FIG. 5



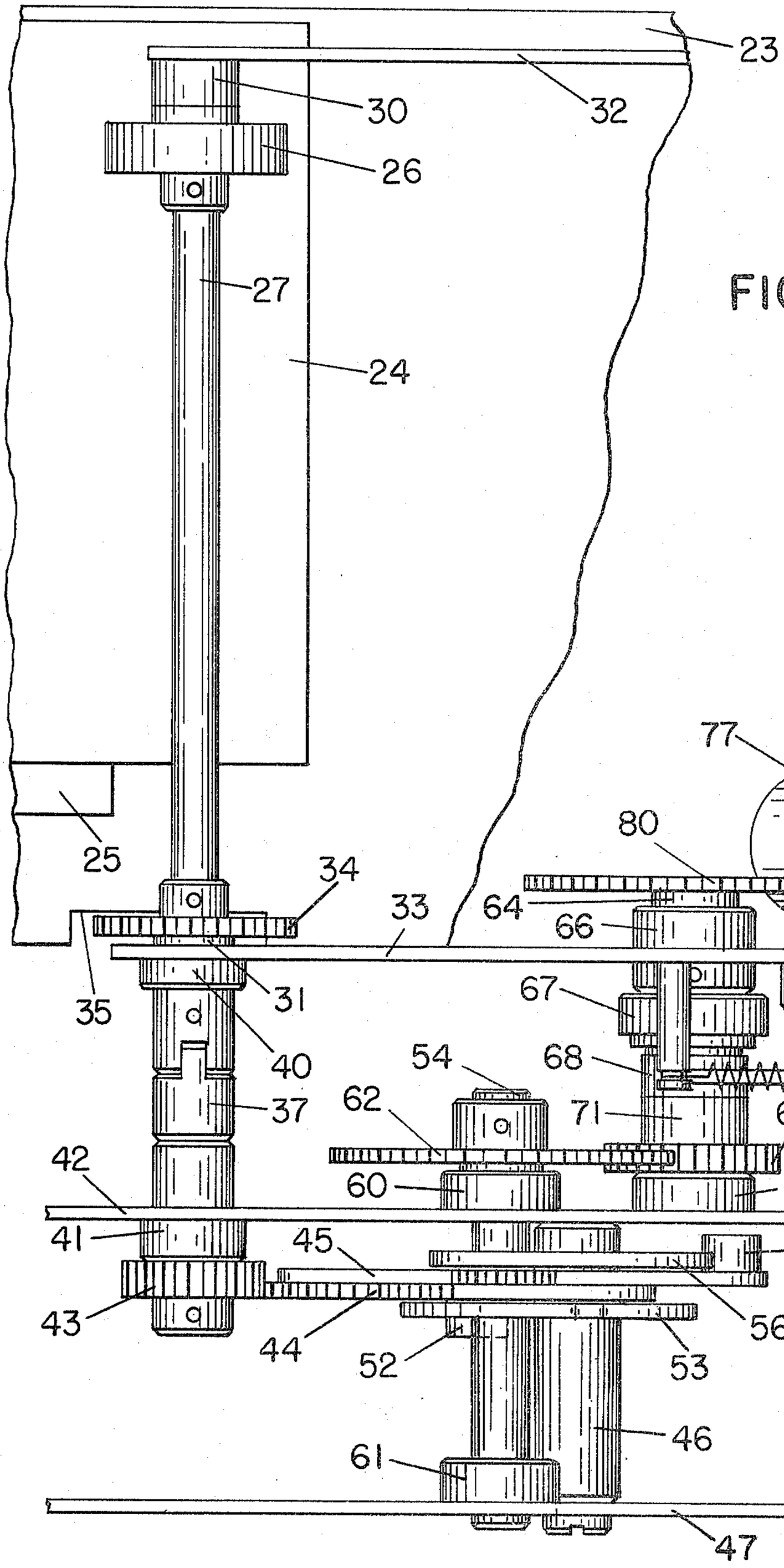

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FIG. 2

FIG. 3

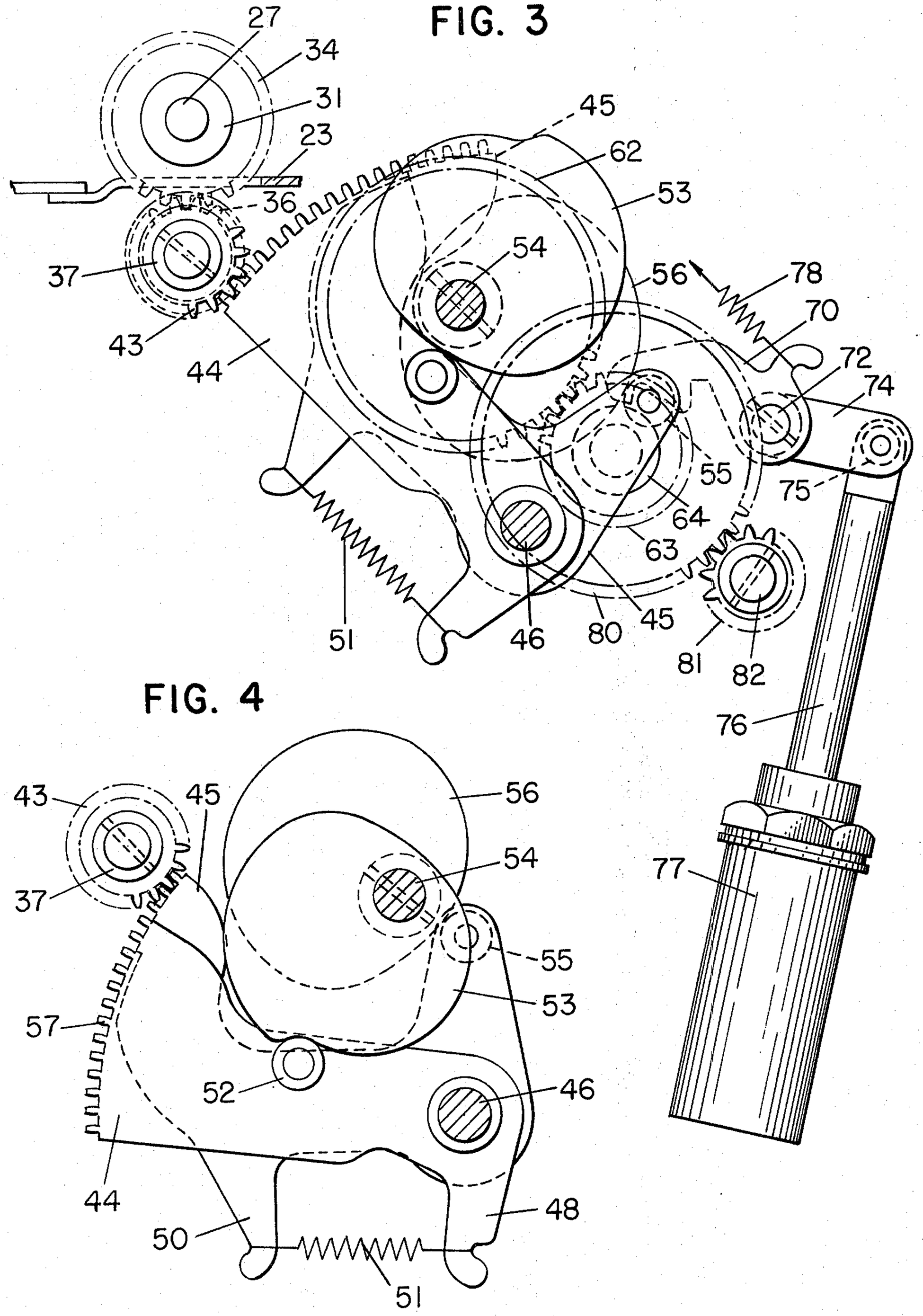
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FIG. 4

PRINTER MECHANISM

BACKGROUND OF THE INVENTION

The present invention is directed to a feed mechanism for feeding a business record to a printing station within a business machine for printing data thereon. In modern day electronic cash registers and data terminal devices, a record slip is positioned on a slip table to be subsequently fed into the cash register where data of the business transaction performed by the cash register is printed thereon. Each subsequent operation of the cash register will result in the printing of data on successive print lines of the record slip until the business transaction is completed, at which time the record slip is removed from the terminal and given to the customer.

In order to process the transaction in the minimum amount of time, it is desirable to have the record slip automatically positioned adjacent the printing station so that the required print line will receive the printed data. Prior mechanisms have utilized a punch mechanism to punch a control aperture in the record slip during each printing operation and a sensing device to position the record slip for the next printing operation upon sensing the control aperture as the record slip is fed back towards its home position. This type of mechanism produces jam-ups of the feed mechanism due to the failure of the sensing mechanism to sense the control aperture in the card. Other mechanisms have used complex and costly control mechanism for adjusting the record slip to print on the desired print line. Therefore, it is an object of this invention to provide a record member feed mechanism for use in a business machine to automatically position a selected print line on a record member adjacent a printing station during succeeding machine operations wich is simple, reliable and inexpensive.

SUMMARY OF THE INVENTION

This object and others are achieved by providing a record member feed mechanism which includes a pair of gear segments mounted in a side-by-side relationship and which together drives a feed roller for moving a record member to and from a printing station located within a business machine. During the feed-in movement of the record member, the segments are positioned in tandem by a pair of cam members to move the record member a predetermined length to position a print line on the record member adjacent a printing station. At the end of the feed-in movement of the record member, the gear segments are moved to an overlap position by the cams wherein during the feed-out movement of the record member, the segments will move the record member a distance which is one print line space less than the feed-in distance. In this latter position, the next print line on the record member will be conditioned to be moved to the printing station for the printing of data thereon during the next print operation.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of the electronic cash register embodying the present invention.

FIG. **2** is a partial detailed top view of the slip feed mechanism.

FIG. **3** is a partial detailed side view of the slip feed mechanism showing the gear segments in a tandem position.

FIG. **4** is a partial detailed side view of the gear segments showing the segments in an overlapped position.

FIG. **5** is a schematic diagram of the timing operation of the cam line showing the positioning of the gear segments by the cam members.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. **1**, there is shown a perspective view of an electronic cash register **20** for performing merchandizing transactions in which the present invention is utilized. Included in the construction of the cash register **20** are such well known features as a keyboard **21** for inserting merchandise data into the register and an indicator panel **22** for displaying the data so inserted. Located on the left side of the electronic cash register is a slip table **23** on which a record slip **24** (FIG. **2**) is placed, the record slip containing a plurality of print lines (not shown) on which the data of the transaction is to be printed. The operator will position the record slip **24** along a guide **25** (FIG. **2**) on the slip table **23** with the first printing line aligned with a mark (not shown) on the table **23.** After the data of the transaction has been inserted into the keyboard **21** of the cash register and an operation of the cash register has been initiated, the feed mechanism of the instant application will drive the slip **24** forward a predetermined distance to a printing position where the information is printed on the first entry line of the slip. After the printing operation has occurred, the feed mechanism will then feed the slip back out a distance which is one entry line less than the first feed movement. This return movement positions the second entry line of the record slip adjacent the reference mark. Subsequent operation of the cash register will result in the printing of information on each succeeding entry line of the record slip until the transaction is completed. At that time, the slip will be removed from the slip table and given to the customer.

Referring to FIG. **2**, there is shown a top view of the record slip feed mechanism which includes a drive roller **26** pinned to a drive shaft **27** journaled within bearings **30, 31** secured to the side frames **32, 33** respectfully of the machine. The drive roller **26** coacts with a pressure roller (not shown) in a manner well known in the art to engage the record slip **24** for feeding the slip toward or away from a printing position adjacent a printing mechanism (not shown) located in the cash register. The drive roller **26** is operated by a gear train which includes a drive gear **34** (FIGS. **2** and **3**) pinned to the drive shaft **27** adjacent the side frame **33** and which extends through a slot **35** (FIG. **2**) in the slip table **23** and into engagement with a feed gear **36** (FIG. **3**). The feed gear **36** is pinned to a shaft **37** journaled within bearings **40, 41** (FIG. **2**) secured to the side frames **33, 42,** respectfully, of the machine. Pinned to the other end of the shaft **37** adjacent the side frame **42** is a second feed gear **43** which engage the tooth edges of a pair of segments **44, 45** (FIGS. **2, 3,** and **4**) rotatably mounted adjacent to each other on a shaft **46** secured between the side frames **42, 47** (FIG. **2**) of the machine.

As best seen from FIG. **4,** the segment **44** has a depending arm portion **48** while segment **45** has a similar arm portion **50,** each of the arm portions engaging a

spring **51** mounted therebetween which normally rotates the segments about the shaft **46** in a direction towards each other. As shown in FIG. **4**, rotatably mounted on segment **44** is a cam roller **52** which is urged into engagement with a cam **53** secured to a cam shaft **54** by the action of the spring **51**. Similarly, a cam roller **55** rotatably mounted on the segment **45** is urged by the spring **51** into engagement with a cam **56** pinned to the cam shaft **54**. As will be described more fully hereinafter, clockwise rotation of the cam shaft **54** through 360° will result in the cams **53, 56** rocking the segments **44, 45** in a counter-clockwise direction. During the first 180° rotation of the shaft **54**, the segments will be rocked from the position shown in FIG. **3** to the position shown in FIG. **4**. This movement of the segments will rotate the gear **43** clockwise resulting in the record slip **24** being moved to a printing position by the feed roller **26**. After a printing operation has occurred, the shaft **54** will be rocked through the second 180° of its rotation resulting in the clockwise rotation of the segments **44, 45** by the cams **53, 56** about the shaft **46**. This movement results in the rotation of the gear **43** in a counter-clockwise direction which moves the record slip **24** back to its home position. As seen in FIG. **3**, the segments **44, 45** are positioned in tandem by the cams **53, 56** at the start of the first feed operation so that during the first counter-clockwise rotation of the segments, the gear teeth **57** of both segments will feed the slip **23** a predetermined distance to the printing position. As shown in FIG. **5**, between 165° and 175° of the first 180° rotation of the cam shaft **54**, the cam **53** will rock the segment **44** clockwise with relation to the segment **45** under the action of the spring **51** thereby overlapping the tooth surfaces of the segments **44, 45**. This movement reduces the total number of teeth **57** that is available to rotate the gear **43** counter-clockwise during the second 180° rotation of the cam shaft **54**. This second movement of the gear **43** positions the slip in the home position one entry line less than at the start of the feed-in movement. As shown in FIG. **5**, between 270° and 355° of rotation of the cam line **54** the cam **53** will rotate the segment **44** counter-clockwise with respect to segment **45** so that at the end of the clockwise movement of the segments, the segments will be again in a tandem relationship as shown in FIG. **3** preparatory for the next print operation.

As shown in FIG. **2**, the cam shaft **54** is rotatably mounted within bearing **60** secured to the side frame **42** and bearing **61** secured to the side frame **47** of the machine. The cam shaft **54** is selectively operated by a drive system which includes a gear member **62** pinned to the cam shaft **54** and which engages a clutch gear **63** rotatably mounted on a clutch shaft **64**. As best seen from FIG. **2**, the clutch shaft **64** is journaled within a bearing **65** secured to the side frame **42**. The other end of the clutch shaft **64** is rotatably mounted within a bearing **66** mounted on the side frame **33**. Pinned to the clutch shaft **64** is a clutch drum **67** which engages a spring clutch member **68** having a slot within which is positioned one end of a clutch pawl **70** (FIGS. **2** and **3**) for normally holding the spring clutch member **68** in a disengaged position with respect to the clutch shaft **64** in a manner well known in the art. The spring clutch member **68** is positioned adjacent a sleeve member **71** which overlaps the spring portion of the spring clutch adjacent the clutch gear **63**. The spring clutch construction is not critical to the present invention and can be of any conventional design, many of which are well

known in the art. An example of a spring clutch that may be utilized in the present embodiment is found in U.S. Pat. No. 2,930,463 which issued to Dodge et al. on Mar. 29, 1960.

The clutch pawl **70** (FIGS. **2** and **3**) is pinned to a shaft **72** rotatably supported within a bearing member **73** secured to the side frame **33**. Secured to the other end of the shaft **72** is an arm **74** to which is mounted a stud **75**. Rotatably mounted on the stud **75** is one end of a plunger **76** of a solenoid **77** mounted within the framework of the machine. As shown in FIG. **3**, the clutch pawl **70** is normally urged in a counter-clockwise direction by the spring **78** into engagement with the spring clutch **68** disabling the operation of the clutch. Upon the momentary energizing of the solenoid **77**, the plunger **76** will rock the shaft **72** and the pawl **70** clockwise against the action of the spring **78**, thereby removing the pawl **70** from the spring clutch member **68** releasing the spring clutch to couple the rotation of the clutch shaft **64** to the clutch gear **63**.

The clutch shaft **64** is constantly being driven in a clockwise direction by a drive system which includes a drive gear **80** secured to the end of the shaft **64** and which engages a gear **81** secured to the main drive shaft **82** journaled in a bearing **83** secured to the side frame **33**. The shaft **83** is constantly rotating in a clockwise direction as viewed in FIG. **3**. Upon release of the spring clutch by the clutch pawl **70**, the clutch member **68** will engage the clutch shaft **64** and rotate the clutch gear **63** in a counter-clockwise direction and the gear **62** and the cam shaft **54** in a clockwise direction. Rotation of the gear **63** through 360° will rotate the gear **62** through 180°. Since the energizing of th solenoid **77** is momentary, as soon as the clutch member **68** starts to rotate in a counter-clockwise direction, the solenoid **77** is deenergized allowing the spring **78** to rock the pawl **70** counter-clockwise against the clutch member **68**. Upon completion of 360° rotation of the clutch member **68**, the pawl **70** will snap into the slot (not shown) in the clutch member **68** under the action of the spring **78**, thereby disengaging the spring clutch from the clutch shaft **64**. The pawl **70** will hold the clutch member **68** and the clutch gear **63** in a disengaged position until the next energizing pulse is received by the solenoid **77**.

In the operation of the feed mechanism, after a record slip **24** has been positioned on the slip table **23**, the operator will insert data into the keyboard **21** (FIG. **1**) of the electronic cash register and initiate a machine operation in a manner that is well known in the art which results in the momentary energizing of the solenoid **77**. As described previously, energizing of the solenoid **77** will rock the clutch pawl **70** clockwise against the action of the spring **78**, thereby releasing the spring clutch member **68** for a 360° rotation resulting in the cam shaft **54** being rotated through 180° by the clutch gear **63**. The clockwise rotation of the cams **53, 56** by the cam shaft **54** through 180° will result in the segments **45, 46** being rocked counter-clockwise, the segments **44, 45** being at this time in a tandem relationship so that the total number of teeth **57** on both segments will rotate the gear **43** and the drive roller **36** a distance to position an entry line on the record slip **24** adjacent the printing mechanism in the cash register which prints the data on the line. At the end of the first 180° rotation of the cam shaft **54**, the segments are moved into an overlapped position.

After the printing operation has been completed, the solenoid **77** is again momentarily energized resulting in the rotation of the clutch wheel **63** through 360° and the clockwise rotation of the cam shaft **54** through 180° as described previously. Rotation of the feed gear **43** by the segments **44, 45** when in overlapped condition will feed out the record slip **24** from the printing position to a home position which is one print line space less than the home position of the record slip prior to the feed in movement of the slip to the printing position. Upon reaching this home position, the cams **53, 56** will have moved the segments **44, 45** to a tandem position as shown in FIG. **5** so that they are in position to feed the record slip to a printing position during the next machine operation wherein the next line space on the record slip will be positioned adjacent the printing mechanism for the printing of data thereon. It will thus be seen that this feed mechanism will automatically position each succeeding line space of the record slip adjacent the printing mechanism for printing data thereon during each operation of the cash register, whereby all the data of the transaction will be printed on the record slip.

While the form of the invention shown and described herein is admirably adapted to fulfill the objects primarily stated, it is to be understood that it is not intended to confine the invention to the one form or embodiment disclosed herein, for it is susceptible of embodiment in various other forms.

What is claimed is:

1. A record material feed mechanism comprising:

a. means engaging a record member for moving the record member when operated;

b. a first drive member for operating said moving means to move the record material a distance commensurate with the movement of said first drive member;

c. a second drive member mounted for movement adjacent said first drive member for engaging and moving said first drive member a first predetermined distance when actuated;

d. a third drive member mounted for movement adjacent said first drive member for engaging and moving said first drive member a second predetermined distance when actuated, said second and third drive members mounted in a side-by-side relationship;

e. means engaging said second and third drive members for normally urging said drive members towards an overlapped position;

f. and actuating means engaging said second and third drive members for reciprocally moving said drive members between a first and second actuated position, said actuating means moving the second and third drive members into a tandem position against the action of said engaging means when moving the drive members from said first to said second actuated position whereby the first drive member will move the record material a distance equal to the sum of said first and second predetermined distances, said actuating means further moving the second and third drive members into an overlapped position when moving the drive members from said second position to said first position whereby the record material will be moved a distance less than the sum of said first and second predetermind distances.

2. The feed mechanism of claim **1** in which said actuating means includes:

a. cam members each engaging one of said second and third drive members;

b. and means for operating said cam members whereby said second and third drive members are simultaneously moved by said cam members between said first and second actuated position and between an overlapped and tandem position thereby varying the length of movement of said first drive member.

3. The feed mechanism of claim **1** in which said urging means comprises a spring member engaging each of said second and third drive members for normally urging said drive members towards an overlapped position.

4. A record material feed mechanism comprising:

a. means engaging a record material for moving the record material when operated;

b. a rotatably mounted gear member for operating said moving means to move the record material a distance commensurate to the rotation of said gear member;

c. a first gear segment rotatably mounted adjacent said gear member for engaging and rotating said gear member, when actuated, a first predetermined distance;

d. a second gear segment rotatably mounted adjacent said gear member for engaging and rotating said gear member, when actuated, a second predetermined distance, said first and second gear segments mounted in a side-by-side relationship;

e. means engaging said first and second gear segments for normally urging said segments towards an overlapped position;

f. and actuating means engaging said gear segments for reciprocally rotating said gear segments between a first and second actuated position, said actuating means simultaneously rotating said gear segments into engagement with said gear member for moving the record material a distance commensurate with the rotation of the gear member and positioning said segments under the action of said urging means in a tandem position during movement of the gear segments from said first to said second actuated position and in an overlapped position during movement of the gear segments from said second to said first actuated position whereby the movement of the record material to said first actuated position is less than the movement to said second actuated position.

5. The feed mechanism of claim **4** in which said gear segments each have a predetermined number of gear teeth on their peripheral edge which engage and rotate said gear member upon movement of the gear segments between said first and second actuated position, the number of gear teeth which engage the gear member being changed between an overlapped and tandem position whereby the length of movement of the record material is changed when moved between said first and second actuated positions.

6. The feed mechanism of claim **4** in which

a. said urging means comprises a spring member engaging each of said gear segments for normally moving said gear segments toward an overlapped position;

b. said actuating means includes cam members each engaging one of said gear segments;

c. and means for operating said cam members whereby the gear segments are simultaneously moved between said first and second actuated position by said cam members to rotate said gear member and to position said gear segments in an overlapped and tandem position thereby varying the length of rotation of said gear member.

7. The feed mechanism of claim **6** in which said cam member operating means includes

a. a rotatably mounted shaft member to which is secured said cam member for rotating said cam members when operated;

b. a constantly operating drive means;

c. a shaft member drive means engaging said shaft member and positioned adjacent said constantly operating drive means;

d. selectively operative clutch means engaging both of said drive means for interconnecting said drive means when operated;

e. and selectively operated actuating means engaging said clutch means for operating said clutch means whereby said shaft member is operated by said constantly operating drive means to rotate said cam members.

8. In a data terminal device constructed and arranged to perform a plurality of printing operations on print lines located on a record member, a mechanism for feeding a record member between a home position and a printing position including:

a. a drive roller engaging the record member for moving the record member a distance commensurate with the rotation of the drive roller;

b. gear means engaging said drive roller for rotating said drive roller when operated;

c. a first rotatably mounted gear segment positioned adjacent said gear means, said gear segment engaging said gear means, when actuated, to operate said gear means to move the record member a predetermined distance between the home position and the printing position;

d. a second rotatably mounted gear segment positioned adjacent said first gear segment, said second gear segment engaging said gear means, when actuated, to operate said gear means to move the record member a predetermined distance between the home position and the printing position;

e. means engaging said gear segments for normally urging said gear segments towards an overlapped position;

f. cam members engaging each of said gear segments for reciprocally actuating said segments between a first and second actuated position and moving said segments between an overlapped and tandem position when operated;

g. and means for operating said cam members whereby said cam members will simultaneously rotate said gear segments into engagement with said gear means for moving the record member a predetermined length and positioning said gear segments under the action of said urging means in a tandem position during movement of the gear segments from said home position to said printing position and in an overlapped position during movement from said printing position to said home position to position a different portion of the record member adjacent the printing position during each succeeding printing operation.

9. The feed mechanism of claim **8** in which said gear segments each have a predetermined number of gear teeth on their peripheral edge which engage and rotate said gear means upon movement of the gear segments between said first and second actuated positions, the number of gear teeth which engage the gear means being changed between an overlapped and tandem position whereby the length of movement of the record material is changed when moved between said first and second actuated positions.

10. The feed mechanism of claim **8** in which said urging means comprises a spring member engaging each of said gear segments for normally urging said gear segments towards an overlapped position.

11. The feed mechanism of claim **8** in which said cam member operating means includes

a. a rotatably mounted shaft member to which is secured said cam member for rotating said cam members when operated;

b. a constantly operating drive means;

c. a cam shaft member drive means engaging said shaft member and positioned adjacent said constantly operating drive means;

d. selectively operated clutch means engaging both of said drive means for interconnecting said drive means when operated;

e. and selectively operated actuating means engaging said clutch means for operating said clutch means whereby said shaft member is operated by said constantly operating drive means to rotate said cam members.

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